

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following remarks is respectfully requested.

Claims 1-9 are presently active in this application, Claims 1, 5 and 6 having been amended by the present Amendment and Claims 10-19 previously withdrawn from consideration as directed to a non-elected invention.

In the outstanding Office Action the drawings were objected to under 37 CFR §1.83(a), Claims 5 and 6 were rejected under 35 USC §112, second paragraph, as being indefinite, Claims 1-4 and 7-9 were rejected under 35 USC §103(a) as being unpatentable over Watanabe (U.S. Patent Application Publication #2004/0021227 A1), hereinafter called "Watanabe 1." Claims 1-9, insofar as Claim 6 can be understood, were rejected under 35 USC §103(a) as being unpatentable over Taniguchi et al (U.S. Patent #6,576,512 B2), and Claims 1-9, insofar as Claim 6 can be understood, were rejected under 35 USC §103(a) as being unpatentable over Watanabe (U.S. Patent #6,048,792), hereinafter called "Watanabe 2."

In response to the objection to the title, the title has been amended to be more descriptive of the claimed invention and to that end states --SEMICONDUCTOR DEVICE HAVING CONTACT PLUG AND BURIED CONDUCTIVE FILM THEREIN AND MANUFACTURING THE SAME--. Accordingly, it is believed that the objection to the title has been overcome.

In response to the rejection under 35 USC §112, second paragraph, Claims 5 and 6 have been amended to delete the phrases "or a combination thereof" and "or a stacked film containing a combination thereof" which were found to be features recited in Claims 5 and 6 not illustrated in the drawings. Accordingly, it is believed that this ground for rejection has been overcome.

In light of the outstanding grounds for rejection on the merits, Claim 1 has been amended to clarify the design of the buried conductive film consistent with Applicants' disclosure shown in FIG. 1. No new matter has been added. In view of this clarification, it is

believed that the outstanding grounds for rejection on the merits have been overcome, for the reasons next discussed.

Briefly recapitulating, Claim 1 is directed to a semiconductor device having a buried conductive film filled in a clearance formed in the contact plug. The recited buried conductive film has a first width in the surface of the buried conductive film and a second width larger than the first width in a deeper position than the surface of the buried conductive film.

As seen from FIG. 4 and as is evident from the related discussion in the specification, seam 15 is formed unintentionally in the process of filling contact hole 12. The section of buried conductive film 16 depends on that of seam 15 because seam 15 is filled with buried conductive film 16. The width of contact hole 12 is narrow in its opening. Therefore, the opening is closed before the contact hole is completely filled with a conductive material. Thus, the (second) width in a deeper position than the surface of buried conductive film 16 is larger than the (first) width in the surface of buried conductive film 16.

Since seam 15 is filled with buried conductive film 16, contact hole 12 is filled without having an opening. As a result, a foundation is shaped in such a manner that an interconnect layer can be formed on contact hole 12 without defectiveness, such as a low electro-migration resistance.

Turning now to the applied prior art, the outstanding Official Action states the finding that Watanabe 1 in FIG. 31 discloses interconnections 114 filled in a clearance formed in the contact plug, as recited in Claim 1. However, interconnections 114 are formed on contact plugs 110, not in a clearance formed in the contact plug as recited in pending Claim 1.

Further, since Watanabe 1 does not disclose that a clearance is formed in contact plugs 110, Watanabe 1 does not suggest the feature of Claim 1 that the buried conductive film is filled in the clearance formed in the contact plug.

Furthermore, since Watanabe 1 does not suggest that the buried conductive film is filled in the clearance, Watanabe 1 does not disclose the feature of Claim 1 that the (second)

width in a deeper position than the surface of the buried conductive film is larger than the (first) width in the surface of the buried conductive film.

Accordingly, for the reasons noted, it is respectfully submitted that amended Claim 1 is clearly patentably distinguishing over Watanabe 1.

Taniguchi et al. in FIGS. 45 and 46 shows lower electrode 30 and plate electrode 32 formed in opening 24h. However, the plate electrode 32 is simply deposited on lower electrode 30 and, unlike as is recited in amended Claim 1, plate electrode 32 is not filled in a clearance formed in lower electrode 30.

Further, Taniguchi et al. does not disclose the feature of amended Claim 1 that the (second) width in a deeper position than the surface of the buried conductive film is larger than the (first) width in the surface of the buried conductive film.

Accordingly, for the reasons noted, it is respectfully submitted that amended Claim 1 is clearly patentably distinguishing over Watanabe 1 and Taniguchi et al. whether considered alone or in combination.

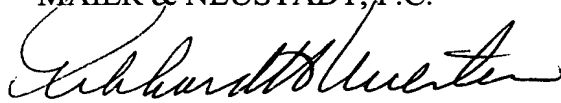
Turning now to Watanabe 2, this reference in FIG. 1B discloses second tungsten film 21 filled in a clearance formed in first tungsten film 20. However, the clearance is not formed inevitably by failing to fill the contact hole with first tungsten film 20. Thus, neither the clearance nor second tungsten film 21 to be filled in the clearance is shaped to have the feature of amended Claim 1 that the (second) width in a deeper position than the surface of the buried conductive film is larger than the (first) width in the surface of the buried conductive film. Accordingly, it is respectfully submitted that Watanabe 2 fails to cure the deficiencies of the other cited references and that amended Claim 1 is clearly patentably distinguishing over Watanabe 1, Taniguchi et al. and Watanabe 2 whether considered alone or in combination.

In view of the apparent patentability of Claim 1, it is respectfully submitted that dependent Claims 2-9 which depend from Claim 1 are likewise patentably distinguishing over the cited art.

Consequently, in view of the present amendment and in light of the above comments, no further issues are believed to be outstanding, and Claims 1-9 are believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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